WHAT IS CLAIMED IS:

1.   1.   A method for calibrating one or more printheads, the method
2 comprising:
3   printing a first reference image using a first portion of image forming
4 points of a first printhead;
5   printing a first diagnostic image using a second portion of image
6 forming points of either the first printhead or a second printhead;
7   detecting a first optical density of the combined first reference image
8 and the first diagnostic image; and
9   determining a compensation value based upon the first optical density.

1.   2.   The method of Claim 1, wherein the first portion of image forming
2 points comprises a first segment of a column of image forming points and wherein the
3 second portion comprises a second segment of the column of image forming points on
4 the first printhead.

1.   3.   The method of Claim 1, wherein the first portion comprises a first
2 segment of a first column of image forming points of the first printhead and wherein
3 the second portion comprises a second segment of a second column of image forming
4 points of the second printhead.

1.   4.   The method of Claim 1, wherein the first diagnostic image is printed
2 using the second portion of image forming points of the first printhead.

1.   5.   The method of Claim 1, wherein the first diagnostic image is printed
2 using the second portion of image forming points of the second printhead.

1.   6.   The method of Claim 1 including advancing the print media a distance
2 such that the first reference image and the diagnostic image are in vertical alignment.

1.   7.   The method of Claim 1 including adjusting a time at which the first
2 portion dispenses ink based upon the compensation value.

8. The method of Claim 1 including forming images using the first portion and the second portion at different times based upon the compensation value.

9. The method of Claim 1, wherein the first reference image is printed while the first printhead is at a first horizontal position and wherein the first diagnostic image is printed while said one of the first printhead and the second printhead is at the first horizontal position.

10. The method of Claim 9 including:
    printing a second reference image with the first portion of the first printhead while the first printhead is at a second horizontal position;
    printing a second diagnostic image with the second portion while said one of the first printhead and the second printhead is at a third horizontal position positively offset from the second horizontal position by a first offset distance;
    detecting a second optical density of the combined second reference image and the second diagnostic image, wherein the compensation value is additionally based upon the second optical density.

11. The method of Claim 10, wherein the first reference image includes at least one mark having a width and wherein the first offset distance is no greater than the width.

12. The method of Claim 10, wherein the first horizontal position and the second horizontal position have a common location.

13. The method of Claim 10 including:
    printing a third reference image with the first portion while the first printhead is at a fourth horizontal position;
    printing a third diagnostic image with the second portion while said one of the first printhead and the second printhead is at a fifth horizontal position positively offset from the fourth horizontal position by a second offset distance greater than the first offset distance; and

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8   detecting a third optical density of a combination of the third reference

9   image and the third diagnostic image, wherein the compensation value is determined

10   based additionally upon the third optical density.

1   14.   The method of Claim 13, wherein the third reference image includes at

2   least one mark, wherein each mark has a width and wherein the third offset distance is

3   less than the width.

1   15.   The method of Claim 13, wherein the third horizontal position is offset

2   from the second horizontal position in a first direction and wherein the fifth horizontal

3   position is offset from the third horizontal position in the first direction.

1   16.   The method of Claim 15 including:

2   printing a fourth reference image with the first portion while the first

3   printhead is at a sixth horizontal position;

4   printing a fourth diagnostic with the second portion while said one of

5   the first printhead and the second printhead are at a seventh horizontal position

6   negatively offset from the sixth horizontal position by a third distance offset; and

7   detecting a fourth optical density of a combination of the fourth

8   reference image and the fourth diagnostic image, wherein the compensation value is

9   determined based additionally upon the fourth optical density.

1   17.   The method of Claim 16 including:

2   printing a fifth reference image using the first portion while the first

3   printhead is at an eighth horizontal position;

4   printing a fifth diagnostic image using the second portion while said

5   one of the first printhead and the second printhead is at a ninth horizontal position

6   negatively offset from the eighth horizontal position by a fourth distance greater than

7   the third distance; and

8   detecting a fifth optical density of a combination of the fifth reference

9   image and the fifth diagnostic image, wherein the compensation value is determined

10   based additionally upon the fifth optical density.

18.   The method of Claim 1, wherein the first portion and the second portion comprise identical portions of the first printhead, wherein the first portion is printed during overall movement as the first printhead in a forward direction and wherein the second portion is printed during overall movement the first printhead in a reverse direction.

19.   The method of Claim 1 wherein the first reference image has a first color and wherein the first diagnostic image has a second color distinct from the first color.

20.   The method of Claim 1, wherein a plurality of horizontal printhead error compensation values are determined by printing the first reference image and the first diagnostic image each a plurality of times while the first printhead and said one of the first printhead and the second printhead are scanned across the medium at a plurality of different print speeds.

21.   The method of Claim 20, wherein at least one image forming points is in both the first portion and the second portion.

22.   The method of Claim 1, wherein the first portion and the second portion have mutually exclusive image forming points.

23.   The method of Claim 1, wherein the first portion is designed to be spaced from the second portion by a predetermined distance in a first direction, wherein the first diagnostic image is printed on the print medium using the first portion while the first printhead is at a first horizontal position and wherein the second diagnostic image is printed upon the print medium using the second portion while said one of the first printhead and the second printhead is at a second horizontal position spaced from the first position by the predetermined distance in the first direction.

24.   The method of Claim 23, wherein the second portion is on the first printhead.

1   25.   The method of Claim 1, wherein the first reference image includes a
2 first plurality of marks, wherein each of the first plurality of marks is printed upon the
3 medium using the first portion of the first printhead and wherein the first diagnostic
4 image includes a second plurality of marks, wherein each of the second plurality of
5 marks is printed upon the medium using the second portion of said one of the first
6 printhead and the second printhead.

1   26.   The method of Claim 1, wherein the first portion and the second
2 portion each include a plurality of image forming points.

1   27.   The method of Claim 1, wherein the first reference image is printed by
2 dispensing a material from the first portion of image forming points.

1   28.   The method of Claim 1, wherein the first reference image is printed by
2 applying heat with the first portion of image forming points.

1   29.   The method of Claim 1, wherein the first reference image and the first
2 diagnostic image at least partially overlap.

1   30.   The method of Claim 1 including moving the first printhead along a
2 single scan axis while printing both the first reference image and the first diagnostic
3 image.

1   ` 31.   The method of Claim 1, wherein the first reference image and the first
2 diagnostic image each include at least one mark having a major height in a first
3 direction and a minor width and wherein the first reference image and the first
4 diagnostic image are offset from one another perpendicular to the first direction.

1   32.   A printing system comprising:
2   a printhead having image forming points;
3   a sensor; and
4   a controller, wherein the controller is configured to generate first
5 control signal and a second control signal, wherein the printhead is configured to print
6 a reference image upon the print medium using a first portion of the image forming

7   points and a diagnostic image upon the print medium using a second portion of the

8   image forming points in response to the first control signal, wherein the sensor is

9   configured to determine an optical density of a combination of the reference image

10   and the diagnostic image in response to the second control signal and the controller is

11   configured to determine a compensation value based upon the optical density.

1   33.   The system of Claim 32, wherein the controller is configured to

2   generate a third control signal based upon the determined compensation value and

3   wherein the carriage mechanism is configured to move the printhead in response to

4   the third control signals.

1   34.   The system of Claim 32, wherein the controller is configured to

2   generate third control signals and wherein the media handling system is configured to

3   advance the print medium between printing of the reference image and the diagnostic

4   image in response to the third control signals.

1   35.   The system of Claim 32 including moving the first printhead along a

2   single scan axis while printing both the reference image and the diagnostic image.

1   36.   The system of Claim 32, wherein the reference image and the

2   diagnostic image each include at least one mark having a major height in a first

3   direction and a minor width and wherein the reference image and the diagnostic

4   image are offset from one another perpendicular to the first direction.

1   37.   A printing system comprising:

2   a first printhead having first image forming points;

3   a second printhead having second image forming points;

4   an optical sensor; and

5   a controller, wherein the controller is configured to generate first

6   control signal and a second control signal, wherein the first printhead is configured to

7   print a reference image upon the print medium using a first portion of the first image

8   forming points, wherein the second printhead is configured to print a diagnostic image

9   upon the print medium using a second portion of the second image forming points in

10   response to the first control signal, wherein the sensor is configured to determine an

11   optical density of a combination of the first reference image and the first diagnostic

12   image in response to the second control signal and the controller is configured to

13   determine a compensation value based upon the optical density.

1   38.   The system of Claim 37, wherein the controller is configured to

2   generate a third control signal based upon the determined horizontal printhead error

3   compensation value and wherein the carriage mechanism is configured to move the

4   second printhead in response to the third control signals.

1   39.   The system of Claim 37, wherein the controller is configured to

2   generate third control signals and wherein the media handling system is configured to

3   advance the print medium between printing of the first diagnostic image and the

4   second diagnostic image in response to the third control signals.

1   40.   A computer-readable media comprising:

2   executable instructions configured to direct a printing system to:

3   print a reference image on a print medium using a first portion

4   of image forming points of a first printhead;

5   print a diagnostic image on the print medium using a second

6   portion of image forming points of one of the first printhead and a second printhead;

7   detect an optical density of a combination of the reference

8   image and the diagnostic image; and

9   determine a compensation value for at least one of the first

10   portion and the second portion based on the optical density.

1   41.   A printing system comprising:

2   at least one printhead configured to form reference and diagnostic

3   images using a first portion and a second portion of the at least one printhead;

4   a sensor configured to detect optical densities of the images;

5   a processor configured to determine a compensation value for the

6   second portion relative to the first portion from the optical densities; and

7   a carriage drive configured to be calibrated based upon the

8   compensation value.

1   42.   A printing system comprising:

2   means for printing a reference image extending along an axis on a print

3   medium;

4   means for printing a diagnostic image extending along the axis on the

5   print medium;

6   means for detecting an optical density of a combination of the

7   reference image and the diagnostic image; and

8   means for determining a compensation value based on the optical

9   density.

1   43.   A method for calibrating one or more printheads, the method

2   comprising:

3   printing patches of reference images and diagnostic images across a

4   range of relative offsets between the reference images and their corresponding

5   diagnostic images, wherein each reference image is formed using a first portion of

6   image forming points of a first printhead and wherein each diagnostic image is

7   formed using a second portion of image forming points of either the first printhead or

8   a second printhead;

9   detecting optional densities of the patches; and

10   determining a compensation value for the second portion based upon

11   the detected optical densities.

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